PATENT
Attorney Docket No. 401188

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

MISUMI et al.

Application No.:	Unassigned	Art Unit:	Unassigned
Filed:	May 4, 2001	Examiner:	Unassigned
For:	SEALED SEMICONDUCTOR DEVICE AND LEAD FRAME USED FOR THE SAME		

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D. C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

IN THE SPECIFICATION

Replace the paragraph beginning at page 1, line 5, with:

The present invention relates to a sealed semiconductor device and a lead frame used for the sealed semiconductor device, particularly to a sealed semiconductor device holding the interval between an internal lead and a semiconductor chip almost constant and a lead frame used for the sealed semiconductor device.

Replace the paragraph beginning at page 1, line 11, with:

An LOC (Lead On Chip) semiconductor device is described below as an example of conventional sealed semiconductor device obtained by sealing a semiconductor chip with a resin. In the LOC semiconductor device, a pad is formed nearby the center of a semiconductor chip and an internal lead extending to the vicinity of the pad is provided. Therefore, the LOC semiconductor device has an advantage that a larger semiconductor chip can be mounted compared to a structure of bonding a wire to a lead located at the side face of the semiconductor chip.

Replace the paragraph beginning at page 1, line 19, with:

As shown in Fig. 28, in the case of an LOC semiconductor device, a semiconductor chip 101 is fixed on a die pad 103 through a die pad material 104. A lead 102 which includes an internal lead 102a extends to the vicinity of a pad (not illustrated) on the semiconductor chip 101. The tip end of the internal lead 102a and the pad are wire-bonded by a gold wire 105. Then, the semiconductor chip 101 and the internal lead 102a are sealed with a molded resin 106.

Replace the paragraph beginning at page 1, line 26, with:

In the case of this LOC semiconductor device, however, as shown in Fig. 29, when setting the semiconductor chip 101 and internal lead 102a in a mold and sealing them with the mold resin 106, the semiconductor chip 101 may be shifted toward the internal lead 102a due to the difference in flow resistance between a mold resin 106a flowing by the upper side of the semiconductor chip 101 and a mold resin 106b flowing by the lower side of the semiconductor chip 101.

Replace the paragraph beginning at page 1, line 33, with:

Therefore, the internal lead 102a and the surface of the semiconductor chip 101 are excessively close each other, the capacitance between them fluctuates, and thereby timing of an input signal and an output signal may be shifted.

Replace the paragraph beginning at page 2, line 10, with:

The insulating layer 107 is continuously formed along the direction in which the internal leads 102a are arranged (direction almost orthogonal to the paper surface) so as to be present between every internal lead 102a and the semiconductor chip 101. The gaps between each internal lead 102a and the insulating layer 107 and between the insulating layer 107 and the semiconductor chip 101 are fixed by an adhesive.

Replace the paragraph beginning at page 2, line 20, with:

Thereby, fluctuation of the capacitance between the internal lead 102a and the surface of the semiconductor chip 101 because the leads are excessively close each other is prevented and it is possible to control the shift of timing between an input signal and an output signal.

Replace the paragraph beginning at page 3, line 2, with:

Moreover, though the insulating material 107 generally uses a resin film, the resin film generally has a high hygroscopicity. The moisture absorbed in the insulating material 107 is evaporated due to heat when mounting a semiconductor device sealed by the resin on a substrate. In this case, cracks may occur on the mold resin 106.

Replace the paragraph beginning at page 3, line 7, with:

Particularly, the insulating layer 107 absorbs much moisture because the layer 107 is continuously formed along the direction in which internal leads 102a are arranged (direction almost perpendicular to the paper surface) and has a comparatively large contact area with the internal leads 102a and semiconductor chip 101. Therefore, when the moisture is evaporated, cracks tend to more easily occur in the mold resin 106.

IN THE CLAIMS

Replace the indicated claims with:

1. (Amended) A sealed semiconductor device comprising:

semiconductor chip portions;

a lead frame portion including internal lead portions extending on surfaces of the semiconductor chip portions; and

holding members holding said semiconductor chip portions and said internal lead portions at intervals and fixed to only one of said semiconductor chip portions and said internal lead portions.

3. (Amended) The sealed semiconductor device according to claim 2, wherein said tape member is located in areas peripheral to said semiconductor chip portions.

4. (Amended) The sealed semiconductor device according to claim 1, wherein said holding members include protrusions protruding toward said semiconductor chip portions and provided in said internal lead portions.

5. (Amended) The sealed semiconductor device according to claim 4, wherein said protrusions are bends in said internal lead portions.

6. (Amended) The sealed semiconductor device according to claim 5, wherein crest portions of the bends of said internal leads contact said semiconductor chip portions.

7. (Amended) The sealed semiconductor device according to claim 4, wherein said internal lead portions include an original internal lead electrically connected with said semiconductor chip portions and dummy internal leads, and said protrusions are part of said dummy internal lead portions.

9. (Amended) The sealed semiconductor device according to claim 4, wherein said protrusions contact areas peripheral to said semiconductor chip portions.

10. (Amended) The sealed semiconductor device according to claim 9, wherein said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said protrusions contact said die pad.

11. (Amended) The sealed semiconductor device according to claim 1, wherein said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said holding members include protrusions fixed to said die pad and protruding toward said internal leads.

12. (Amended) The sealed semiconductor device according to claim 1, wherein said holding members are located opposite an injection port of a mold when sealing said semiconductor chip portions and said internal lead portions with a resin.

13. (Amended) A lead frame for a sealed semiconductor device obtained by sealing semiconductor chip portions with a resin, comprising:

an internal lead portion located toward a pad portion located nearly centrally on said semiconductor chip portions and electrically connected with said pad portion; and

holding lead portions for holding said semiconductor chip portions and said internal lead at intervals by contacting said semiconductor chip portions.

14. (Amended) The lead frame according to claim 13, wherein said holding lead portions include said internal lead portion, and including a tape member bonded and fixed to said holding lead portions at positions corresponding to areas peripheral to said semiconductor chip portions.

IN THE ABSTRACT

Replace the abstract with:

ABSTRACT OF THE DISCLOSURE

In an LOC semiconductor device, a semiconductor chip is fixed on a die pad through a die pad material. A lead including an internal lead extending to the vicinity of a pad provided to the semiconductor chip is put in place. A tape member is placed at positions corresponding to four corners of the semiconductor chip between the internal lead and the semiconductor chip. The tape member is bonded and fixed only to the internal lead but it is not bonded or fixed to the semiconductor chip and merely contacts the surface of the semiconductor chip.

REMARKS

The foregoing amendments are made to correct minor translational errors and to meet United States requirements as to form. No new matter is added.

Respectfully submitted,

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SPECIFICATION, CLAIMS AND ABSTRACT AS PRELIMINARILY AMENDED

Amendments to the paragraph beginning at page 1, line 5:

The present invention relates to a sealed semiconductor device and a lead frame used for the sealed semiconductor device, particularly to a sealed semiconductor device ~~capable of~~ holding the interval between an internal lead and a semiconductor chip almost constant and a lead frame used for the sealed semiconductor device.

Amendments to the paragraph beginning at page 1, line 11:

An LOC (Lead On Chip) semiconductor device is described below as an example of conventional sealed semiconductor device obtained by sealing a semiconductor chip with a resin. In the LOC semiconductor device, a pad is formed nearby the center of a semiconductor chip and an internal lead extending ~~up~~ to the vicinity of the pad is provided. Therefore, the LOC semiconductor device has an advantage that a larger semiconductor chip can be mounted compared to a structure of bonding a wire to a lead located at the side face of the semiconductor chip.

Amendments to the paragraph beginning at page 1, line 19:

As shown in Fig. 28, in the case of an LOC semiconductor device, a semiconductor chip 101 is fixed on a die pad 103 through a die pad material 104. A lead 102 ~~is formed~~ which includes an internal lead 102a ~~extending up~~ extends to the vicinity of a pad (not illustrated) ~~provided to~~ on the semiconductor chip 101. The tip end of the internal lead 102a and the pad are wire-bonded by a gold wire 105. Then, the semiconductor chip 101 and the internal lead 102a are sealed with a ~~mold~~ molded resin 106.

Amendments to the paragraph beginning at page 1, line 26:

In the case of this LOC semiconductor device, however, as shown in Fig. 29, when setting the semiconductor chip 101 and internal lead 102a in a mold and sealing them with the mold resin 106, the semiconductor chip 101 may be shifted toward the internal lead 102a due to the difference in flow resistance between a mold resin 106a flowing ~~through~~ by the upper side of the semiconductor chip 101 and a mold resin 106b flowing ~~through~~ by the lower side of the semiconductor chip 101.

Amendments to the paragraph beginning at page 1, line 33:

Therefore, the internal lead 102a and the surface of the semiconductor chip 101 are excessively close each other, the ~~capacity~~ capacitance between them fluctuates, and thereby ~~timings~~ timing of an input signal and an output signal may be shifted ~~from each other~~.

Amendments to the paragraph beginning at page 2, line 10:

The insulating layer 107 is continuously formed along the direction in which the internal leads 102a are arranged (direction almost orthogonal to the paper surface) so as to be present between every internal lead 102a and the semiconductor chip 101. The ~~gap~~

gaps between each internal lead 102a and the insulating layer 107 and ~~the gap~~ between the insulating layer 107 and the semiconductor chip 101 are fixed by an adhesive.

Amendments to the paragraph beginning at page 2, line 20:

Thereby, ~~it is prevented that~~ fluctuation of the ~~capacity~~ capacitance between the internal lead 102a and the surface of the semiconductor chip 101 ~~is fluctuated~~ because ~~they~~ the leads are excessively close each other is prevented and it is possible to control the shift of timing between an input signal and an output signal.

Amendments to the paragraph beginning at page 3, line 2:

Moreover, though the insulating material 107 generally uses a resin film, the resin film generally has a high hygroscopicity. The moisture absorbed in the insulating material 107 is evaporated due to ~~the~~ heat when ~~setting~~ mounting a semiconductor device sealed by the resin ~~to~~ on a substrate. In this case, cracks may occur on the mold resin 106.

Amendments to the paragraph beginning at page 3, line 7:

Particularly, the insulating layer 107 absorbs much moisture because the layer 107 is continuously formed along the direction in which internal leads 102a are arranged (direction almost perpendicular to the paper surface) and has a comparatively large contact area with the internal leads 102a and semiconductor chip 101. Therefore, when the moisture is evaporated, cracks tend to more easily occur ~~on~~ in the mold resin 106.

Amendments to the existing claims:

1. (Amended) A sealed semiconductor device comprising:

semiconductor chip portions ~~and~~;

a lead frame portion including internal lead portions extending on surfaces of the semiconductor chip portions~~, wherein~~; and

holding members ~~are included which hold~~ holding said semiconductor chip portions and said internal lead portions at ~~predetermined~~ intervals ~~by being~~ and fixed to ~~either~~ only one of said semiconductor chip portions and said internal lead portions ~~but not being fixed to the other~~.

3. (Amended) The sealed semiconductor device according to claim 2, wherein said tape member is ~~set so as to be~~ located in areas peripheral to said semiconductor chip portions.

4. (Amended) The sealed semiconductor device according to claim 1, wherein said holding members include ~~first~~ protrusions protruding toward said semiconductor chip portions and provided ~~to~~ in said internal lead portions.

5. (Amended) The sealed semiconductor device according to claim 4, wherein said ~~first~~ protrusions are ~~formed by bending~~ bends in said internal lead portions.

6. (Amended) The sealed semiconductor device according to claim 5, wherein crest portions of the bends of said internal leads ~~formed by being bent~~ contact ~~with~~ said semiconductor chip portions.

7. (Amended) The sealed semiconductor device according to claim 4, wherein said internal lead portions include an original internal lead electrically connected with said semiconductor chip portions and dummy internal leads, and said ~~first~~ protrusions are ~~formed on~~ part of said dummy internal lead portions.

9. (Amended) The sealed semiconductor device according to claim 4, wherein said ~~first~~ protrusions contact ~~with~~ areas peripheral to said semiconductor chip portions.

10. (Amended) The sealed semiconductor device according to claim 9, wherein said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said ~~first~~ protrusions contact ~~with~~ said die pad.

11. (Amended) The sealed semiconductor device according to claim 1, wherein said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said holding members include ~~second~~ protrusions fixed to said die pad and protruding toward said internal leads.

12. (Amended) The sealed semiconductor device according to claim 1, wherein said holding members are ~~formed so as to be at least~~ located ~~at the~~ opposite ~~side to~~ an injection port of a mold ~~resin~~ when sealing said semiconductor chip portions and said internal lead portions with a ~~mold~~ resin.

13. (Amended) A lead frame ~~used~~ for a sealed semiconductor device obtained by sealing semiconductor chip portions with a ~~mold~~ resin, comprising:

an internal lead portion ~~set~~ located toward a pad portion ~~formed nearby the center of~~ located nearly centrally on said semiconductor chip portions and electrically connected with said pad portion; and

holding lead portions for holding said semiconductor chip portions and said internal lead at ~~predetermined~~ intervals by contacting ~~with~~ said semiconductor chip portions.

14. (Amended) The lead frame according to claim 13, wherein said holding lead portions include said internal lead portion, and including a tape member ~~is~~ bonded and fixed to said holding lead portions at positions corresponding to areas peripheral to said semiconductor chip portions.

Amendments to the abstract:

ABSTRACT OF THE DISCLOSURE

In ~~the case of~~ an LOC semiconductor device, a semiconductor chip is fixed on a die pad through a die pad material. A lead including an internal lead extending ~~up~~ to the vicinity of a pad provided to the semiconductor chip is ~~set~~ put in place. A tape member is ~~set to~~ placed at positions corresponding to four corners of the semiconductor chip between the internal lead and the semiconductor chip. The tape member is bonded and fixed only to the internal lead but it is not bonded or fixed to the semiconductor chip and merely contacts ~~with~~ the surface of ~~a~~ the semiconductor chip.

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CLAIMS PENDING AFTER PRELIMINARY AMENDMENT

1. A sealed semiconductor device comprising:

semiconductor chip portions;

a lead frame portion including internal lead portions extending on surfaces of the semiconductor chip portions; and

holding members holding said semiconductor chip portions and said internal lead portions at intervals and fixed to only one of said semiconductor chip portions and said internal lead portions.

2. The sealed semiconductor device according to claim 1, wherein said holding members include a tape member bonded and fixed to said internal lead portion.

3. The sealed semiconductor device according to claim 2, wherein said tape member is located in areas peripheral to said semiconductor chip portions.

4. The sealed semiconductor device according to claim 1, wherein said holding members include protrusions protruding toward said semiconductor chip portions and provided in said internal lead portions.

5. The sealed semiconductor device according to claim 4, wherein said protrusions are bends in said internal lead portions.

6. The sealed semiconductor device according to claim 5, wherein crest portions of the bends of said internal leads contact said semiconductor chip portions.

7. The sealed semiconductor device according to claim 4, wherein said internal lead portions include an original internal lead electrically connected with said semiconductor chip portions and dummy internal leads, and said protrusions are part of said dummy internal lead portions.

8. The sealed semiconductor device according to claim 7, wherein said semiconductor chip portions are almost rectangular, and

said original internal lead is set toward a pad portion formed nearby centers of said rectangular semiconductor chip portions from a pair of faced sides of said semiconductor chip portions,

said dummy internal leads are arranged toward the semiconductor chip portions from the other pair of sides facing the direction almost orthogonal to said pair of faced sides.

9. The sealed semiconductor device according to claim 4, wherein said protrusions contact areas peripheral to said semiconductor chip portions.

10. The sealed semiconductor device according to claim 9, wherein

said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said protrusions contact said die pad.

11. The sealed semiconductor device according to claim 1, wherein

said semiconductor chip portions include a semiconductor chip body and a die pad for mounting said semiconductor chip body, and

said holding members include protrusions fixed to said die pad and protruding toward said internal leads.

12. The sealed semiconductor device according to claim 1, wherein said holding members are located opposite an injection port of a mold when sealing said semiconductor chip portions and said internal lead portions with a resin.

13. A lead frame for a sealed semiconductor device obtained by sealing semiconductor chip portions with a resin, comprising:

an internal lead portion located toward a pad portion located nearly centrally on said semiconductor chip portions and electrically connected with said pad portion; and

holding lead portions for holding said semiconductor chip portions and said internal lead at intervals by contacting said semiconductor chip portions.

14. The lead frame according to claim 13, wherein said holding lead portions include said internal lead portion, and including a tape member bonded and fixed to said holding lead portions at positions corresponding to areas peripheral to said semiconductor chip portions.

15. The lead frame according to claim 13, wherein said holding lead portions are dummy internal lead portions.

16. The lead frame according to claim 15, wherein

said internal lead portion is set toward said pad portion of almost-rectangular semiconductor chip portions from a pair of faced sides of the almost-rectangular semiconductor chip portions, and

said holding lead portions are arranged toward said semiconductor chip portions from the other pair of sides facing the direction almost orthogonal to said pair of faced sides.